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ABSTRACT

This paper reports three studies designed to determine whether children show selective attention and/or differential memory to slide pictures of same-sex vs. opposite-sex models and activities. Attention was measured using a feedback EEG procedure, which measured the presence or absence of alpha rhythms in the subjects' brains during presentation of slides. (An alpha rhythm reflects a relaxed mental state; the backlog or absence of alpha is interpreted as attention.) Recall, recognition, and preference for pictures were measured after presentation. In the first study, 16 children, ages 5-6 and 9-10 years, viewed slides of models performing sex-neutral tasks. Alpha presence caused a slide stimulus to come on, and alpha blocking (attention) caused it to go off. No differences were found in attention to male vs. female slides, but all children recalled significantly more male than female slides. In Study 2, 32 children (of the same ages as in Study 1) viewed different models performing sex-appropriate, sex-inappropriate, and sex-neutral tasks. Each stimulus remained on for 1 minute of viewing (no-alpha) time. There were no differences in attention to same-sex models, although all children preferred same-sex models and recalled and preferred same-sex tasks. In the third study 16 children, 9-10 years old, saw six slides from Study 2 for which viewing time was increased. Both boys and girls recalled the male model more, boys preferred male tasks, and girls preferred male and female tasks equally. For the third time there was no evidence of selective attention to same-sex models. Additional research is needed on: (1) performance constraints on sex role behavior, (2) selective rehearsal of sex role knowledge, and (3) selective exposure to sex role knowledge in the peer group rather than by research on selective attention to equally present adult models. (SB)

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SEX ROLE LEARNING: A TEST OF THE SELECTIVE ATTENTION HYPOTHESIS

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Paper presented at the Biennial Meeting of the Society for Research in Child Development, New Orleans, Louisiana, March, 1977; and at the 48th Annual Meeting of the Eastern Psychological Association, Boston, Massachusetts, April, 1977.

The question of how children acquire knowledge about sex roles and emotional investment in their sex roles has motivated much theory and research. Social learning theory, which encompasses both reinforcement and modeling theory, proposes that children learn their sex roles by reward or punishment of their own behavior and by observation of the consequences of others' behavior. When these others are powerful, nurturant, or similar to themselves children learn to behave like such models. Cognitive-developmental theory posits that children acquire a concept of "male" or "female" which changes with age and intellectual growth. Their concept of their own gender early takes on value and determines gender-related attitudes and activities. Both social learning and cognitive-developmental theories agree in proposing some mechanism of selective attention to same-sex models to account for gender role learning. Thus they both predict that boys spend more time looking at males, while girls spend more time looking at females, because of perceived similarity between child and model. In order to test this prediction from both theories we collected data on children's attention to same-sex vs. opposite-sex people as well as to gender-related activities.

Previous studies on selective attention have two faults; first, they study attention or looking at models or they study memory for the models, rather than the simultaneous examination of both attention and memory. Such separation precludes partialing out attention from memory. We think of attention as acquisition (or competence) and memory as performance. A second fault is in the variable measures of looking across studies with different subject populations. We will report three studies on children in which both attention and memory -- acquisition and performance -- were studied by the method of feedback EEG, which is a recently developed, unobtrusive, but highly reliable and controlled method.

Occipital alpha is the most prominent brain rhythm in a relaxed but wakeful human. "Blocking" of alpha is correlated with "looking behavior" which in turn reflects "attention" (Mulholland, 1973). Thus, our operational definition of attention is the suppression of alpha which is our index of "looking behavior". When we use the term "looking" we are actually referring to no-alpha, our dependent variable. We used the blocking or suppression of occipital alpha rhythms because the technical procedures required for accurate studies of eye movements (a head or jaw support, bite board, etc.) are distracting and frightening for young children. Previous studies using eye movements were not technically accurate measures of looking behavior.

We asked: do children of 5-6 and 9-10 show selective attention (or acquisition) and/or differential memory (or performance) to same vs. opposite-sex models and activities?

Our first experiment determined if children looked longer at the same-sex model when they viewed slides of a male and female model performing sex-neutral tasks, such as riding a bicycle and reading a magazine. Sixteen children, 4 boys and 4 girls aged 5-6 and 9-10, saw 6 slides of the male and female adults. The slides were matched in brightness, background, subject positions, and model's clothing and were presented in a counterbalanced order.

The general purpose of the EEG feedback system was: (1) to detect and quantify intervals of alpha and no-alpha, and (2) to present or remove stimuli contingent upon the presence or absence of alpha during feedback. This was made possible by an on-line computer program tied into the EEG apparatus. Your handout describes briefly the apparatus and methodology and contains references for more detailed descriptions.

The following feedback method (we call it Loop 1) was used: when the child

produced alpha the slide went ON; subsequently, when the child looked at the slide, alpha was "blocked" and the slide went OFF. When alpha returned, the sequence was repeated until the slide was presented 30 times. When the subject was paying attention, the durations of no-alpha increased. Conversely, if the subject's attention was low, the subject habituated more quickly and no-alpha durations decreased. Thus, it took the subject longer to view the 30 presentations of the slide if attention was high than if it was low.

After the viewing, we asked the children (1) to recall the slides they had seen; (2) to check a serial presentation of pictures for those they recognized; and (3) to rank order the pictures they preferred from an array of the pictures they had seen. The results revealed no difference in looking at the male or female model slides although both boys and girls recalled a greater number of male slides.

Given the null results of the first experiment, we decided to (1) increase the number of children (in case the small N obscured the effect); (2) to use different models maximally discriminated for sex-typed cues with controls to match the models for attractiveness; (3) to add a sex-appropriateness factor for task (thus we added sex-appropriate, sex-inappropriate, and sex-neutral tasks) as well as outdoor and indoor tasks; (4) to alter the feedback design (we call it Loop 2) so that the slide went ON, rather than OFF, during the no-alpha, since it seemed more reasonable that the slides stayed on while the children looked at them; and (5) to control the stimulus presentation time even more rigorously than it had been in our first experiment by use of the computer program.

Thus, 32 children, 8 boys and 8 girls aged 5-6 and 9-10, saw 12 slides of a male and female model performing sex-appropriate, sex-inappropriate, and sex-neutral tasks. For example, smoking a pipe was a male-appropriate task

while knitting a sweater was a female-appropriate task. Your handout contains an example of the slides. Each child also saw a 13th slide of the couple together at the end of the sequence which was an added control so that we could measure directed looking behavior in comparison with the experimental condition slides. The children were told to <u>really look</u> at this picture before it came on. Each slide was turned off by the computer after 1 minute of viewing (or no-alpha) time.

Again, the results revealed no difference in time spent looking at the same-sex models. The children looked, however, significantly more at the control (or "really look") slide than at the last model slide. They looked more at the outdoor (or brighter) slides than at the indoor (or darker) slides. Also, the older children looked more at the slides overall than the younger children. The performance, or memory and preference data, showed that both sexes recalled and preferred the same-sex task and preferred the same-sex model.

However, the older children in Experiment 2 had demonstrated a "ceiling" effect. That is, they produced sufficiently little alpha during the entire viewing so that might have accounted for the null finding. Therefore, we decided to run another group of older children in a third experiment. The viewing time of the slides was increased from 1 minute to 5 minutes of no-alpha.

Sixteen children, 8 boys and 8 girls aged 9-10, saw the 6 indoor slides (plus the "really look" slide). For the third time we found a null result for same-sex looking. Nonetheless we again got significant results for more looking at the "really look" slide than for the preceeding or last model slide. As in Experiment 1, both boys and girls recalled the male model more. However, the boys preferred the male tasks while the girls preferred the male and female tasks equally.

While no one can prove the null hypothesis, our failure to find significant differences in 3 separate experiments in the amount of attention to male and female models, regardless of the nature of the tasks, makes it seem to us difficult to sustain the selective attention hypothesis. The lack of significant differences can not be attributed to insensitivity of the alpha blocking response as an index of visual attention, because (1) we got significantly more looking at the "really look" slide than at the last model slide; (2) we got significantly more looking at the brighter than the darker slides, as required for the method to be valid (we controlled brightness, however, in all our studies); and (3) we got significantly more looking overall for the older children than for the younger children.

The finding of no sex difference in attention to same-sex models has important implications for the study of sex role acquisition. If our studies tell us anything about sex-typing, it is that children look at or have competence about the behavior of both sexes; but their behavior, as measured by recall and preference, is determined by other factors, such as eliciting events, and/or reinforcement consequences, or .....? Maccoby and Jacklin (1974) as well as Money and Ehrhardt (1972) have argued that the acquisition of behavior through modeling is not sex-typed; that instead we acquire a wide repertoire of potential behavior -- both "male" and "female". We learn much more than we ever use in our overt behavior. Money and Ehrhardt call this learning view "bigenderism". Based on our findings we believe that "bigenderism" of sex role knowledge deserves greater attention. We must look elsewhere than at selective attention, however, for what controls children's performance of gender-typed behavior.

We suggest three areas for further research on sex role learning.

The first area to look at is performance constraints on children's behavior. These constraints may be the important sex role learning of children since children (especially boys) learn early that when they perform out-role behaviors they will be ostracized for doing so.

We are not suggesting, however, although children know a great deal about the behavior of both sexes, that children have equal role knowledge. Boys do know more about baseball while girls do know more about fashions. Thus, a second area to look at is selective rehearsal of sex role knowledge. Grusec and Brinker (1972) found that children who were rewarded for imitating one of two adults (both male) were better able to recall more of the rewarded adult's subsequent behavior. However, films of their eye movements revealed that they looked at each adult the same amount of time, in spite of the difference in recall. It may be that stimuli with greater reward value have a greater probability of entering the rehearsal buffer and receiving more rehearsal.

Third, it may be that the experimental situation, in which information about males and females is equally present, is artificial and does not reflect what happens in real life; i.e., children receive selective exposure to, or selective opportunity to observe, sex-role behavior in the peer group. Children as young as age 2 already prefer same-sex playmates, and their preference lasts throughout the grade school years when children self-select almost totally into same-sex groups. It may be that in these groups boys learn "appropriate" boy behavior and girls learn "appropriate" girl behavior. We know some facts about these groups. Girls play in smaller groups than boys do (often with one or two "best" friends). Girls also show less rough-and-tumble play and fighting than boys in their larger groups do (Maccoby and Jacklin, 1974).

But we need to learn more about what is learned regarding sex roles and how it is learned in these groups. Detailed and extended naturalistic observations are needed to obtain this information.

In conclusion, we believe that sex role learning can better be understood by research on: (1) performance constraints on sex role behavior, (2) selective rehearsal of sex role knowledge, and (3) selective exposure to sex role knowledge in the peer group rather than by research on selective attention to equally present adult models.

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Sex Role Learning: A Test of the Selective Attention Hypothesis

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Summary of the Results of the Three Experiments

ACQUISITION

All 3 experiments had a null result for same-sex looking (sex of subjects by sex of model interaction).

PERFORMANCE

Experiment 1 5-6, 9-10 N = 16

1. Both sexes recalled the male model more ($p<.05$).

Experiment 2 5-6, 9-10 N = 32

1. Both sexes recalled the same-sex task ($p<.05$).
2. Both sexes preferred the same-sex task ($p<.01$).
3. Both sexes preferred the same-sex model ($p<.01$).

Experiment 3 9-10 N - 16

1. Both sexes recalled the male model more ($p<.05$).
2. Males preferred the male tasks while females preferred male and female tasks equally ($p<.05$).

APPARATUS AND METHODOLOGY

The major components of the apparatus were (a) a light-tight, soundproof, electrically shielded chamber; (b) a polygraph for recording brain rhythms and event marks; (c) a variable frequency bandpass filter; and (d) an amplitude threshold detector including state relay outputs which controlled electronic shutters attached to the front of (e) two slide projectors. Recordings were obtained from standard left (O_1) and right (O_2) occipital electrode placements with a grounded electrode placed on the right ear lobe. A small on-line PDP-12 computer aided in the collection, storage, and analysis of the data.

Alpha was defined (or calibrated) for each individual: (a) the bandpass filter limits were adjusted to within ± 1 Hz. of a subject's dominant alpha frequency; and (b) amplitude threshold was set up at 25% of the person's eyes-closed-in-the-dark "resting" alpha. The minimum duration of a detectable alpha "burst" was set up at 0.25 seconds (see Boudrot, 1972; Goodman, 1973; and Mulholland, 1973).

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Legend for Figure

Example of task for model slides: Sex-appropriate (man) and sex-inappropriate (woman)